

Cognitive Deficit and Mental Health in Homeless Transition-Age Youth



WHAT'S KNOWN ON THIS SUBJECT: Neurocognitive deficits, academic delays, and behavioral and emotional problems are well documented in school-age children in relation to socioeconomic disadvantage and residential instability. Despite adversity, early intervention can facilitate healthy cognitive, emotional, and social development.



WHAT THIS STUDY ADDS: Homeless youth demonstrated elevated rates of untreated psychiatric disorders, low academic achievement, and impaired neurocognition. Mental health and neurocognitive symptoms were associated with vocational outcome. Intervention beyond employment services alone is needed to improve functioning.

abstract



BACKGROUND AND OBJECTIVES: There is increasing recognition of the cognitive consequences of socioeconomic adversity during childhood, which can impair learning and negatively affect social and emotional development. However, there is a paucity of research on cognitive functioning and mental health among transition-age homeless youth. This study aimed to address this knowledge gap by examining the prevalence and functional significance of cognitive impairment and mental health disorders in a sample of 18- to 22-year-old homeless youth.

METHODS: Participants ($N = 73$) were recruited from a vocational support program at Covenant House New York, a care agency for homeless youth. Assessments included diagnostic assessment for mental health disorders and evaluation of neurocognition and vocational outcomes.

RESULTS: Youth demonstrated histories of academic instability, academic achievement below expectation, and high rates of untreated psychiatric disorders, the most prominent of which were anxiety, substance use, and mood disorders. Of those who had a mental health diagnosis, more than half demonstrated cognitive deficits. Performance on measures of working memory and verbal memory was $<70\%$ of that of the age-matched normative population. Cognitive impairment was associated with a significant risk for making a wage insufficient for independent living.

CONCLUSIONS: These data confirm the need to focus on cognitive as well as emotional and physical health in transition-age youth. Comprehensive intervention at this later developmental stage has the potential to facilitate the acquisition of skills needed for academic, vocational, and independent living success in adulthood. *Pediatrics* 2014;134:e138–e145

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KEY WORDS

homeless youth, transition-age, cognition, mental health

ABBREVIATIONS

BAI—Beck Anxiety Inventory
BDI—Beck Depression Inventory—II
D-KEFS—Delis Kaplan Executive Function System
DSM-IV—*Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*
FSIQ—Full Scale IQ
GSI—Global Severity Index
PSDI—Positive Symptom Distress Index
PST—Positive Symptom Total
ROP-CH—Rights of Passage—Covenant House
SCID-IV—Structured Clinical Interview for DSM-IV
SCL-90-R—Symptom Checklist-90-R
WAIS—Wechsler Adult Intelligence Scale
WTAR—Wechsler Test of Adult Reading

Dr Saperstein helped design the study and drafted the manuscript; Dr Lee conducted the data analyses and helped draft the initial results section; Ms Ronan verified data presented in the Results section and assisted with writing the initial manuscript draft; Ms Seeman assisted with writing the initial manuscript draft; Dr Medalia conceptualized and designed the study and reviewed the manuscript; and all authors approved the final manuscript as submitted.

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Homeless youth are a vulnerable and alarmingly numerous population, representing at least one-third of homeless people in the United States per year.^{1,2} It is well established that significant adversity during childhood, including residential instability and poverty, increases risk for impairments in neurocognition, enduring emotional or behavioral problems, and significant academic delays.^{3–12} Residential instability in childhood is an identified risk factor for homelessness in adulthood, and longer duration of homelessness during youth is associated with poorer prospective functional outcomes.¹³ There is increasing recognition of the cognitive consequences of socioeconomic adversity, such as impaired learning and limited acquisition of the skills needed for academic, vocational, and independent living success into adulthood.¹⁴ Thus, without intervention, impaired neurocognition may contribute to the persistence of poverty across generations. Neurocognitive deficits have been well studied among school-age children in relation to low socioeconomic status and residential instability.^{3–11} Pronounced differences have been reported in language, executive functioning, and memory systems. Children at significant socioeconomic disadvantage also show rates of emotional and behavioral problems that may coincide with or impose additional risk for academic delays or neurocognitive impairment.^{12,13} Indeed, homeless adults display higher rates of cognitive impairment and mental illness than the general population, with grave functional consequences.^{14–20} Thus, there is a clear need to design interventions that facilitate healthy cognitive, emotional, and social development in disadvantaged youth. In fact, cognitive training programs show promise in improving foundational cognitive skills among at-risk young children.²¹ However, there is a paucity of research on neurocognition among transition-age youth

(ages 18–24 years) who experience significant socioeconomic adversity. Perhaps intervention during early adulthood, also a key developmental period, may be imperative to alter a potentially detrimental course of disability and promote competence and resilience for securing long-term independence.²²

This study represents a collaboration between Columbia University Medical Center and Covenant House New York, the nation's largest adolescent care agency serving homeless, runaway, and at-risk youth. Participants were concurrently enrolled in the Rights of Passage–Covenant House (ROP-CH) program, a time-limited residential program providing employment support to those seeking to live independently. Data were collected as part of a larger study on the feasibility and potential efficacy of providing neurocognitive training to homeless transition-age youth with psychiatric diagnoses. In this preliminary report, our aims were to characterize the cognitive and mental health status of help-seeking transition-age youth and describe the impact of impaired cognition or mental health symptoms on measures of vocational functioning.

Given previous research on the cognitive and mental health impact of homelessness in children^{7–13} and adults,^{14–20} in regard to the first aim we expected the average cognitive functioning to be below the population mean and the incidence of mental health diagnoses in this transition-age sample to be higher than has been reported for nonhomeless peers. For the second aim, we expected that, consistent with previous research,^{22–26} cognitive and psychological dysfunction would be associated with decrements in work functioning. We did not propose any a priori hypotheses as to specific areas of cognitive impairment or prevalence of specific psychiatric diagnoses. Analyses were planned to support or refute the hypothesized need for intervention and to help de-

lineate key intervention targets for homeless transition-age youth.

METHODS

Participants and Procedures

This research study is an ongoing registered clinical trial (www.clinicaltrials.gov) conducted under the guidance of the New York State Psychiatric Institute institutional review board. Participants are 18- to 22-year-old residents in the ROP-CH, a transitional living and employment support program for homeless youth in New York City. On a rolling basis, ROP-CH staff referred all English-speaking residents who were in ROP-CH ≥ 1 month. At any time, $\sim 88\%$ of ROP-CH residents met these criteria and were approached by research staff for recruitment. Approximately 32% of those residents refused participation or could not be contacted because of work or school schedule conflicts. Interested residents met with a trained research assistant or author A.M.S. to provide informed consent. Residents were informed of all study procedures, the voluntary and confidential nature of study participation, risks, benefits, and compensation procedures. A total of 73 residents consented to participate; given that the total census at any time point is ~ 120 , this sample represents 60.8% of the ROP-CH youth. Participants were first assessed for educational and work histories, mental health diagnosis, and intellectual functioning (see the Instruments section for description of measures), which totaled 45 minutes in duration. Employment and income data were verified with ROP-CH staff.

A neurocognitive assessment was conducted by a trained research assistant, supervised by author A.M., for those who met criteria for any *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV) Axis I disorder.²⁷ Participants also completed paper-and-pen self-report measures of anxiety, depression, and general mental health

symptoms. Assessment time was 1.5 to 2 hours and took place at Covenant House at a mutually convenient time for research staff and participants.

Instruments

The Wechsler Test of Adult Reading (WTAR)²⁸ is a brief reading test composed of 50 words, used as an assessment tool for older adolescents and adults to estimate intellectual functioning. The WTAR was normed with the Wechsler Adult Intelligence Scale (WAIS) and was used in this study to derive a demographics-predicted Full Scale IQ (FSIQ). The WTAR was used to screen for mental retardation (FSIQ <70), which was not observed in any participant. The FSIQ score was subsequently used as a descriptive measure.

The Structured Clinical Interview for DSM-IV (SCID-IV)²⁹ is a semistructured interview for the diagnosis of Axis I (major mental) disorders. The interview was conducted by a master's-level research assistant or author A.M.S., who participated in New York State Psychiatric Institute SCID-IV training and reliability sessions. All diagnoses were finalized by consensus of the 2 raters. The SCID-IV was used to determine eligibility for the larger clinical trial but was used here to characterize the sample.

A battery of neurocognitive tests was compiled to represent cognitive domains of verbal memory, working memory, attention, processing speed, and executive functioning. Raw scores on each measure were translated into *Z* scores based on published test norms. *Z* scores were averaged together within each cognitive domain to yield 5 domain scores. A Global Cognition Score was derived from the average of the domain *Z* scores. Cognitive impairment was defined as having ≥ 1 cognitive domain *Z* score of -1.00 or below, indicating performance 1 SD below the normative mean. A brief description of the items within each domain score are as follows.

Verbal Memory: Wechsler Memory Scale-IV,³⁰ Logical Memory I and Logical Memory II total scores, and California Verbal Learning Test-II³¹ Immediate Free Recall total and Long Delay Free Recall total. These 4 tests capture the ability to accurately recall a narrative or word list.

Working Memory: Wechsler Adult Intelligence Scale-III (WAIS-III)³² Digit Span Subtest and Arithmetic Subtest Total Scores. These 2 tests measure the ability to perform mental manipulations of information presented.

Attention: Delis Kaplan Executive Function System (D-KEFS)³³ Trail Making Visual Scanning, Trail Making Number Sequencing, and Trail Making Letter Sequencing Scores. These 3 tests capture the ability to attend to specific information while filtering out irrelevant information to efficiently perform a task.

Processing Speed: WAIS-III³² Symbol Coding and Symbol Search Subtest Scores. These 2 tests are timed paper-and-pen coding tasks.

Executive Functioning: D-KEFS³³ Trail Making Letter Number Switching Score, D-KEFS Verbal Fluency-Letter Fluency Score, D-KEFS Tower Test Score. These 3 tests capture the ability to rapidly switch attention, spontaneously generate word lists, and use reasoning and planning to problem solve in a timed task, respectively.

The Beck Depression Inventory-II (BDI-II)³⁴ is a 21-item self-report questionnaire assessing the presence and severity of depression. Each item is a list of 4 statements about a symptom of depression, arranged in increasing severity from 0 to 3. The BDI-II total score is the sum of all items and can be interpreted as minimal (0–13), mild (14–19), moderate (20–28), and severe (29–63). Cronbach's α for the BDI-II is 0.91.³⁵

The Beck Anxiety Inventory (BAI)³⁶ is a 21-item multiple-choice self-report inventory used to measure the sever-

ity of a range of anxiety symptoms in the past week. Symptoms are rated on a scale from 0 to 3. The BAI total score is interpreted as indicating minimal (0–7), mild (8–15), moderate (16–25), or severe (26–63) levels of anxiety. Cronbach's α for the BAI is 0.92.³⁷

The Symptom Checklist-90-R (SCL-90-R)³⁸ is a 90-item self-report questionnaire used to evaluate a broad range of psychological problems and symptoms of psychopathology. The Global Severity Index (GSI) measures overall psychological distress, the Positive Symptom Distress Index (PSDI) measures the intensity of symptoms, and the Positive Symptom Total (PST) indicates the number of self-reported symptoms. Raw scores were converted into *T* scores based on gender-based norms.

RESULTS

A total of 73 participants at ROP-CH signed informed consent. Because of scheduling conflicts, 4 people discontinued after providing informed consent and 2 delayed beginning the study and were excluded from analyses. The remaining 67 participants provided demographic, educational, and employment information. Participants were 51.5% male and, on average, 20.46 years ($SD = 0.99$) old. Participants self-identified as 74.3% Black or African American, 18.6% Latino, 5.7% Caucasian, and 1.4% other race or ethnicity. Years of education ranged from 8 to 15. More than half (55.2%) of participants obtained a high school diploma, and 16.4% obtained General Educational Development certification. Only 1 participant reported having an associate's degree, and the remainder (26.9%) had not completed any formal schooling. As an indicator of stability in childhood, participants reported the number of elementary, middle, and high schools attended. The minimum was 3 and maximum was 8, with a mean of 6.4 schools. The mean WTAR demographics-predicted FSIQ was 84.92 ($SD = 6.79$),

with a range between 73 (lowest) and 100 (highest).

The majority of participants were currently employed (81.5%) and reported a mean of 25.20 (SD = 14.53) hours of work per week. Participants most commonly worked part-time in food service, retail, security, or janitorial services and earned an average of \$839.94 (SD = 646.51) in the month before study enrollment. All employed ROP-CH residents are required to contribute a proportion of monthly earnings to a savings account. The mean monthly contribution to savings was \$87.17 (SD = 89.26), with a range from \$0 to \$467.78. Making a livable monthly wage is an important indicator of ability to achieve or maintain financial independence; at Covenant House, a livable wage is defined as monthly earnings of \geq \$1600. In our sample, 16% were classified as currently earning a livable wage.

Of those who completed the diagnostic assessment ($N = 67$), 83.6% received an Axis I mental health diagnosis and completed the neurocognitive and symptom assessment. Diagnostic information is summarized in Table 1. A total of 9 subjects had comorbid disorders; 4 with primary attention-deficit/hyperactivity disorder, 4 with primary anxiety disorders, and 1 with a primary mood disorder carried a secondary Axis I diagnosis. Participants who received a diagnosis via semistructured interview self-reported a range of depression and anxiety symptoms. The BDI-II, BAI, and SCL-90-R mean scores and their correlations are presented in Tables 2 and 3, respectively. Neurocognitive assessments were completed in 55 subjects. Of those 55 subjects, 63.6% were classified as impaired, based on scoring 1 SD below the mean on cognitive assessment. A summary of neurocognitive data is presented in Fig 1.

To assess the functional impact of cognitive impairment and mental health symptom scores, we used multiple lo-

gistic regression to examine the categorical outcomes, current employment status (employed or unemployed) and making a livable wage (yes or no). Multiple linear regression analysis examined continuous outcome measures: total hours worked in the past month, mean monthly savings, and months of current employment. Regression results are summarized in Table 4. Mental health predictor variables included BAI and BDI-II total scores and standardized SCL-90-R index scores (T scores) including the GSI, PST, and PSDI. Because the predictor variables were highly correlated, we examined their effects on the functional outcomes by fitting regression models separately. For each model, we included candidate confounders such as age, gender, and education level. Because only those with a mental health diagnosis received neurocognitive testing, we aimed to examine the significance of also having cognitive impairment. We therefore included cognitive impairment in the regression models testing the significance of mental health symptom scores as predictors of functional outcomes.

TABLE 1 DSM-IV Mental Health Diagnoses in Homeless Transition-Age Youth ($N = 67$)

Axis I Disorder	Frequency (%)
Adjustment disorder	13.4
With depressed mood	10.4
With anxiety	1.5
With disturbance of conduct	1.5
Attention-deficit/hyperactivity disorder	10.4
Anxiety disorder	22.4
Panic disorder	3.0
Generalized anxiety disorder	4.5
Posttraumatic stress disorder	3.0
Social phobia	1.5
Anxiety disorder not otherwise specified	10.4
Mood disorder	17.9
Major depressive disorder	14.9
Minor depressive disorder	1.5
Bipolar disorder	1.5
Substance use disorder	19.4
Marijuana abuse	16.4
Alcohol abuse	3.0
None	16.4

TABLE 2 Mental Health Symptom Scores in Homeless Transition-Age Youth ($N = 55$)

Symptom Measure	Range	Mean (SD)
SCL-90-R T scores ^a		
GSI	28.00–81.00	56.51 (11.92)
PSDI	37.00–82.00	60.92 (10.45)
PST	24.00–74.00	54.18 (12.32)
BDI-II total score	0.00–35.00	10.75 ^b (8.35)
BAI total score	0.00–38.00	6.93 ^c (8.80)

^a Clinical range $T > 65$.

^b BDI-II total score 0–13 = minimal severity.

^c BAI total score 0–7 = minimal severity.

TABLE 3 Mental Health Symptom Correlations in Homeless Transition-Age Youth ($N = 55$)

	SCL-90-R		
	GSI	PSDI	PST
BAI	0.60**	0.40*	0.67**
BDI-II	0.65**	0.46**	0.68**

* $P < .01$. ** $P \leq .001$.

For current employment status, the PST score was a significant ($\beta = 0.073$, odds ratio = 1.075, $P = .04$) predictor after age, education level, and having cognitive impairment were accounted for. This implies that we expect a 7.5% increase in the odds of being currently employed with every 1-unit increase on the standardized PST score. Other symptom variables were not significantly associated with current employment status. The total number of hours worked in the past month was significantly associated with the GSI ($\beta = 0.576$, $P = .001$), PST ($\beta = 0.583$, $P < .001$), and BAI ($\beta = 0.771$, $P = .002$) after age, education level, gender, and cognitive impairment were accounted for. The covariates and cognitive impairment were not significant. The sample distribution for months of current employment was highly skewed; we performed a log transformation before the regression analysis. Only age was a significant predictor ($\beta = 0.424$, $P = .04$) of months employed, such that longer duration of employment was associated with older age. For mean monthly savings, GSI ($\beta = 1.886$, $P = .005$), PSDI ($\beta = 2.401$, $P = .002$), and BDI-II ($\beta = 2.102$, $P = .02$) were significant after we included

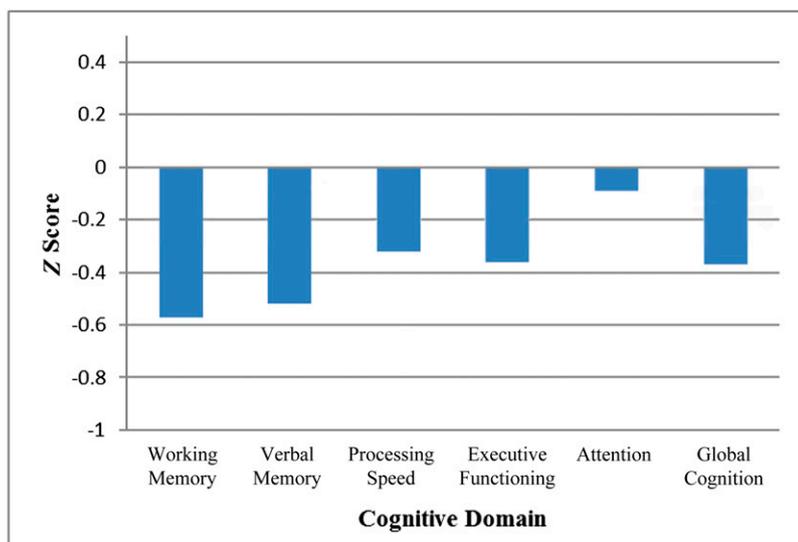


FIGURE 1 Neurocognitive functioning in homeless transition-age youth ($N = 55$).

TABLE 4 Regression Analyses: Predictors of Work Outcomes in Homeless Transition-Age Youth

Functional Outcome	Predictors	β	P
Current employment status ^a	SCL-90-R PST	0.073	.04
	SCL-90-R GSI	0.576	.001
Hours worked, past month ^a	SCL-90-R PST	0.583	<.001
	BAI	0.771	.002
	SCL-90-R GSI	1.886	.005
Mean monthly savings ^a	SCL-90-R PSDI	2.401	.002
	BDI-II	2.102	.02
Months of current employment ^b	Age	0.424	.04
Livable wage ^c	Cognitive impairment	2.395	.04

^a Age, education level, and having cognitive impairment were included in the model and were not significant.

^b Education level and having cognitive impairment were included in the model and were not significant.

^c Age and education level were included in the model and were not significant.

age, education level, gender, and cognitive impairment in the model. All other variables were not significant.

Cognitive impairment was a significant negative predictor of making a livable wage ($\beta = 2.395$, odds ratio = 10.96, $P = .04$) after age, education level, and gender were adjusted for. This implies that a resident without cognitive impairment will make a livable wage 10.96 times more often than one with cognitive impairment. However, combined with mental health symptom scores, it was not significant. Other variables were not significantly associated with making a livable wage.

Exploratory analyses examined a post hoc hypothesis that work outcomes are

differentially related to low versus high anxiety symptom severity. We used a statistical model that estimates segmented relationships in linear regression models with breakpoint/change point estimation.^{39,40} There was a significant positive association between work hours in the past month and BAI symptom severity <17.02 (slope = 5.07, $P = .01$). The association changes to negative among subjects with BAI scores >17.02 (slope = -1.62 , $P = .61$). Similarly, earnings in the past month is positively associated with the BAI score when it is <26.75 (slope = 45.38, $P = .002$). The association changes to negative when the BAI is >26.75 (slope = -69.45 , $P = .35$). These results are presented graphically in Fig 2.

DISCUSSION

There is a growing literature on the neurodevelopmental effects of socioeconomic disadvantage and homelessness in children and ample research on neurocognitive deficits and mental health in homeless adults. However, far fewer studies have characterized neurocognition and mental health in homeless youth as they transition to adulthood. Yet this developmental period is a critical time during which the skills needed for independence in adulthood are acquired and applied. Without the proper foundation and support, youth at a neurocognitive disadvantage may fall behind their age-matched peers, competing for jobs and trying to earn a livable wage. This study examined a unique sample of help-seeking transition-age youth who are participating in an employment support program at Covenant House New York, the nation's largest adolescent care agency for homeless youth. We documented the neurocognitive and mental health status of homeless 18- to 22-year-olds and examined how mental health symptoms and neurocognition affect vocational success. These data extend the findings of previous work documenting the impact of childhood adversity and homelessness.³⁻¹⁴

Results of this study supported the hypotheses associated with the first aim that average cognitive functioning would be below the population mean and there would be greater prevalence of mental health problems. On average, participants demonstrated intellectual functioning in the low average range, 1 SD below the population mean. This is consistent with research in children showing an association between socioeconomic adversity and cognitive development³⁻¹³ and data on neurocognitive impairment in homeless adults.¹⁴⁻²⁰ We found that 83.6% of our sample met criteria for DSM-IV Axis I disorders, the most prevalent of which were anxiety, substance use, and mood disorders. This rate is

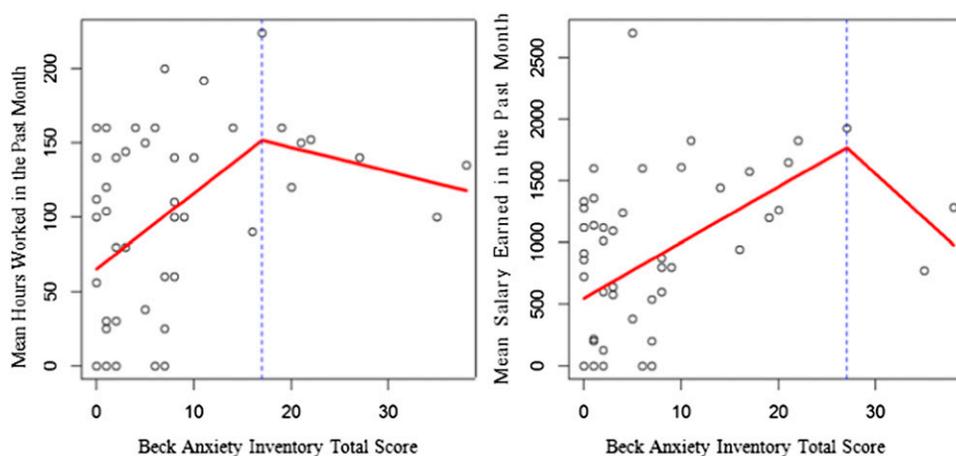


FIGURE 2

Linear regression model of work outcomes as a function of baseline anxiety level in homeless transition-age youth ($N = 55$).

much higher than is found in the general youth population, where about 20% are affected by a current or past mental disorder.^{41,42} Few participants reported currently receiving any treatment, although many reported seeking support from residential staff. These results corroborate findings of prevalent mood disorders and behavioral problems in homeless children^{12,13} and highlight the potential risk for enduring mental health problems if insufficiently addressed, particularly among those who experience persistent environmental stress.

Participants demonstrated a wide range of cognitive ability on measures of working memory, verbal memory, executive functioning, attention, and processing speed. Group means in the domains of working memory and verbal memory indicated that about 70% of age-matched youth scored higher. This is critical given that memory underlies learning, which is pertinent to academic achievement and the acquisition of job and independent living skills. This is also consistent with profiles of socioeconomic status–related disparities in children.^{5,6} The global cognition index group mean indicates a prevalence of neurocognitive deficits on the order of 0.4 SD below the age-normed general population mean.

Research in children indicates low levels of academic achievement associated

with homelessness^{7,9–13} and poverty.^{5,6,8} Transition-age youth also evidenced significant histories of academic instability, with slightly more than half of the group holding a high school diploma and more than a quarter currently with no academic degree. Thus the educational trajectory is poor across all ages of homeless youth.

The second aim of the study was to examine the functional relevance of mental health and neurocognitive status in homeless transition-age youth. In this sample, vocational success is a key program outcome; in a broader context, employment is tied to risk for homelessness. Given that employment is a requirement for program participation, it was not surprising that the majority of participants were currently employed. However, despite the provision of employment services, only 16% earn a monthly wage that would allow them to live independently. In addition, with a mean monthly income of \$839.94, monthly savings were on average \$87.17 per month, indicating a wide gap between program expectations and outcomes. Somewhat counterintuitive is the finding that those who endorse more symptoms of psychopathology work more hours and earn more per month than those with lesser severity of symptoms. However, this association

changes at a high level of symptom severity. Our analyses suggest that a low level of anxiety may be motivating for work, or, alternatively, those who work more hours experience psychological stress but are able to maintain functioning. However, those with severe anxiety symptoms are more likely to exhibit poor work outcomes.

Finally, we reported that cognitive impairment is associated with an elevated risk of making a wage insufficient for independent living. Although this finding raises awareness of the significance of having impaired cognition at this age, we noted that when mental health symptom scores were included in the model, the effect of cognitive impairment was diminished. Neurocognition therefore appears to contribute to poorer vocational functioning in youth with mental health disorders, although those who experience low levels of anxiety may be able to recruit other personal and social resources to achieve work goals.

Limitations in study design affect the generalizability of our findings. First, this was a help-seeking population of homeless transition-age youth who had successfully transitioned from a state of crisis to a stable state in which enrollment in an employment support program was warranted. Second, we report here on a sample from only 1

urban community-based organization. These factors may limit the applicability of our findings to homeless transition-age youth more broadly. Despite the selectivity of this sample, the data indicate additional need for intervention that is not otherwise being provided. Our data suggest that impaired neurocognition and severe psychiatric symptoms may need to be addressed for these youth to progress toward independence. Finally, because this was a cross-sectional study, we can only hypothesize that improving neurocognition or mental health symptoms will positively affect the capacity to live independently. This is a topic of current investigation.

CONCLUSIONS

These data extend previous findings on the cognitive and mental health impact of homelessness in children and adults to transition-age youth. Although intervention in childhood is optimal, attention to cognitive and mental health is imperative at this later developmental stage as well. Support services to aid employment or educational goal attainment provide a foundation for independent living, but more comprehensive intervention is clearly needed. Treatment providers who work with homeless youth should consider routine assessments of emotional and cognitive challenges to

academic or vocational goal attainment. Integrating treatments to improve cognitive and mental health may be crucial so as to halt a potentially detrimental course of impairment and instead promote positive growth through the transition to adulthood.

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REFERENCES

1. The National Center on Family Homelessness. America's youngest outcasts 2010: state report card on child homelessness. Available at: www.FamilyHomelessness.org. Accessed November 14, 2013
2. Toro PA, Dworsky A, Fowler PJ. Homeless youth in the United States: recent research findings and intervention approaches. 2007. National Symposium on Homeless Research. Available at: <http://aspe.hhs.gov/hsp/homelessness/symposium07/toro/>. Accessed November 14, 2013
3. Bradley RH, Corwyn RF. Socioeconomic status and child development. *Annu Rev Psychol.* 2002;53:371–399
4. Edidin JP, Ganim Z, Hunter SJ, Karnik NS. The mental and physical health of homeless youth: a literature review. *Child Psychiatry Hum Dev.* 2012;43(3):354–375
5. Farah MJ, Shera DM, Savage JH, et al. Childhood poverty: specific associations with neurocognitive development. *Brain Res.* 2006;1110(1):166–174
6. Hackman DA, Farah MJ, Meaney MJ. Socioeconomic status and the brain: mechanistic insights from human and animal research. *Nat Rev Neurosci.* 2010;11(9):651–659
7. Obradović J, Long JD, Cutuli JJ, et al. Academic achievement of homeless and highly mobile children in an urban school district: longitudinal evidence on risk, growth, and resilience. *Dev Psychopathol.* 2009;21(2):493–518
8. Noble KG, Norman MF, Farah MJ. Neurocognitive correlates of socioeconomic status in kindergarten children. *Dev Sci.* 2005; 8(1):74–87
9. Parks RW, Stevens RJ, Spence SA. A systematic review of cognition in homeless children and adolescents. *J R Soc Med.* 2007;100(1):46–50
10. Rubin DH, Erickson CJ, San Agustin M, Cleary SD, Allen JK, Cohen P. Cognitive and academic functioning of homeless children compared with housed children. *Pediatrics.* 1996;97(3):289–294
11. Whitman BY, Accardo P, Boyert M, Kendagor R. Homelessness and cognitive performance in children: a possible link. *Soc Work.* 1990;35(6):516–519
12. McCaskill PA, Toro PA, Wolfe SM. Homeless and matched housed adolescents: a comparative study of psychopathology. *J Clin Child Psychol.* 1998;27(3):306–319
13. Zima BT, Wells KB, Freeman HE. Emotional and behavioral problems and severe academic delays among sheltered homeless children in Los Angeles County. *Am J Public Health.* 1994;84(2):260–264
14. Backer TE, Howard EA. Cognitive impairments and the prevention of homelessness: research and practice review. *J Prim Prev.* 2007;28(3–4):375–388
15. Bremner AJ, Duke PJ, Nelson HE, Pantelis C, Barnes TRE. Cognitive function and duration of rooflessness in entrants to a hostel for homeless men. *Br J Psychiatry.* 1996; 169(4):434–439
16. Burra TA, Stergiopoulos V, Rourke SB. A systematic review of cognitive deficits in homeless adults: implications for service delivery. *Can J Psychiatry.* 2009;54(2):123–133
17. Fazel S, Khosla V, Doll H, Geddes J. The prevalence of mental disorders among the homeless in Western countries: systematic review and meta-regression analysis. *PLoS Med.* 2008;5(12):e225
18. Solliday-McRoy C, Campbell TC, Melchert TP, Young TJ, Cisler RA. Neuropsychological functioning of homeless men. *J Nerv Ment Dis.* 2004;192(7):471–478
19. Spence S, Stevens R, Parks R. Cognitive dysfunction in homeless adults: a systematic review. *J R Soc Med.* 2004;97(8):375–379
20. Levitt AJ, Jost JJ, Mergl KA, Hannigan A, Degenova J, Chung SY. Impact of chronically street homeless tenants in congregate supportive housing. *Am J Orthopsychiatry.* 2012;82(3):413–420
21. Neville HJ, Stevens C, Pakulak E, et al. Family-based training program improves brain function, cognition, and behavior in lower socioeconomic status preschoolers. *Proc Natl Acad Sci USA.* 2013;110(29): 12138–12143
22. Ammerman SD, Kirzner R, Meiningner E, et al. *Homeless Young Adults Ages 18–24: Examining Service Delivery Adaptations.* Nashville, TN: National Health Care for the Homeless Council; 2004
23. Baksheev GN, Allott K, Jackson HJ, McGorry PD, Killackey E. Predictors of vocational recovery among young people with first-episode psychosis: findings from a randomized controlled trial. *Psychiatr Rehabil J.* 2012;35(6):421–427
24. McGurk SR, Mueser KT. Cognitive functioning, symptoms, and work in supported

- employment: a review and heuristic model. *Schizophr Res*. 2004;70(2–3):147–173
25. Mintz J, Mintz LI, Arruda MJ, Hwang SS. Treatments of depression and the functional capacity to work. *Arch Gen Psychiatry*. 1992; 49(10):761–768
 26. Scott J, Fowler D, McGorry P, et al. Adolescents and young adults who are not in employment, education, or training. *BMJ*. 2013;347:f5270
 27. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 4th ed. Washington, DC: American Psychiatric Association; 1994
 28. Wechsler D. *Wechsler Test of Adult Reading*. San Antonio, TX: Pearson Education; 2001
 29. First RL, Gibbon M, Williams JB. *Structured Clinical Interview for DSM-IV Axis I Disorders Patient Edition (SCID-I/P)*. New York, NY: Biometrics Research Department, New York State Psychiatric Institute; 1996
 30. Wechsler D. *The Wechsler Memory Scale*. 4th ed. San Antonio, TX: The Psychological Corporation; 2008
 31. Delis D, Kramer O, Kaplan E, Ober B. *California Verbal Learning Test Manual*. 2nd ed. San Antonio, TX: The Psychological Corporation; 2000
 32. Wechsler D. *Wechsler Adult Intelligence Scale*. 4th ed. San Antonio, TX: The Psychological Corporation; 2008
 33. Delis DC, Kramer JH, Kaplan E, Holdnack J. Reliability and validity of the Delis–Kaplan Executive Function System: an update. *J Int Neuropsychol Soc*. 2004;10(2):301–303
 34. Beck AT, Steer RA, Brown GK. *Manual for the Beck Depression Inventory–II*. San Antonio, TX: Psychological Corporation; 1996
 35. Beck AT, Steer RA, Ball R, Ranieri W. Comparison of Beck Depression Inventories -IA and -II in psychiatric outpatients. *J Pers Assess*. 1996;67(3):588–597
 36. Beck AT, Steer RA. *Manual for the Beck Anxiety Inventory*. San Antonio, TX: Psychological Corporation; 1990
 37. Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: psychometric properties. *J Consult Clin Psychol*. 1988;56(6):893–897
 38. Derogatis L. *Symptom Checklist 90 Revised: Administration, Scoring, and Interpretation*. San Antonio, TX: The Psychological Corporation; 1983
 39. Muggeo VM. Estimating regression models with unknown break-points. *Stat Med*. 2003; 22(19):3055–3071
 40. Muggeo VM. Modeling temperature effects on mortality: multiple segmented relationships with common break points. *Biostatistics*. 2008;9(4):613–620
 41. Kessler RC, Avenevoli S, Costello EJ, et al. Prevalence, persistence, and sociodemographic correlates of DSM-IV disorders in the National Comorbidity Survey Replication Adolescent Supplement. *Arch Gen Psychiatry*. 2012;69(4):372–380
 42. Kessler RC, Avenevoli S, Costello J, et al. Severity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication Adolescent Supplement. *Arch Gen Psychiatry*. 2012;69(4):381–389

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